Chapter 8
Energy

This section addresses the existing energy use and potential changes in use patterns in the area associated with the proposed project. Figure 8-1 shows the boundary of the study area considered in the energy analysis. The energy that would be used to transport sand and gravel (aggregate) to processing facilities both onsite and offsite is also evaluated. The energy required to transport processed material to job sites is not evaluated. Additional details related to energy use are included in Appendix G.

8.1 Existing Conditions

8.1.1 Electrical Use and Supply

Electrical power in the North Bend area is provided by two utility distributors: Puget Sound Energy (PSE) and Tanner Electric Company (Tanner Electric). PSE supplies approximately 95 percent of the power used in the North Bend area. Tanner Electric, which is a smaller utility distributor headquartered in North Bend, supplies the remaining 5 percent.

Aboveground and underground power distribution lines service residences and businesses in the area. An existing underground power distribution line (34-kilovolt [kV], 3-phase), owned by PSE, enters the Upper Site near the Washington State Patrol Fire Training Academy and runs along SE Grouse Ridge Road. A BPA high-voltage utility transmission line runs through the southern border of the Upper Site.

PSE operates the only existing substation in North Bend. This 25-megawatt (MW) substation is at the intersection of Thrasher Avenue and SE 120th Street. Tanner Electric distributes power from PSE's substation through an 8-MW circuit. Tanner Electric has constructed a new 25-MW substation on Alm Way, west of PSE's existing substation. The new substation would supply power to the new Middle School No. 3 (see Figure 8-1) and a proposed commercial office park west of Seattle Truck Town East. The substation has capacity to expand to a 50-MW facility when the need arises and is expected to be operational in December 2001. When it comes online, the substation will have a maximum usage of 8.2 MW, about one-third of the capacity of the substation. PSE has indicated that the new Tanner Electric substation will relieve pressure from PSE's substation, which is currently being used at near full capacity.

8.1.2 Fuel Use and Supply

The study area does not contain any existing fuel storage or dispensing facilities. Three gas stations are located near Exit 34: Seattle Truck

Town East, a 76 station, and a Texaco station. Seattle Truck Town East and the 76 station are both operated by Truck Town, Inc. Truck Town, Inc., also leases a portion of its property (including its storage tanks) to Pacific Pride, a bulk fuel distributor. Truck Town, Inc.'s total fuel storage capacity is 123,000 gallons. The Texaco station sells gasoline and diesel fuel; the station's total storage capacity was not verified.

Oregon Department of Transportation (ODOT) has developed a spreadsheet to estimate energy consumption by vehicles. Fuel use equivalent to 199 million British thermal units (BTUs) per day is consumed in each 1-mile section of Interstate 90 (I-90) from approximately 30,000 cars and trucks (approximately 1,430 gallons of diesel fuel per day per mile). Heavy trucks, which are estimated to represent 20 percent of existing traffic, consume 99.8 million BTUs per day per mile (720 gallons of diesel fuel per day per mile), or about 50 percent of the energy used per mile. Annually, passenger vehicles and trucks consume 72.7 billion BTUs per mile, which is equivalent to approximately 520,000 gallons of diesel fuel per mile. The transportation-related energy impact of each Action Alternative was compared to this baseline.

8.1.3 Natural Gas Use and Supply

Most households in North Bend have natural gas service. The distribution systems are owned and operated by PSE. An existing 4-inch gas main is located along 468th Avenue SE and terminates at Seattle Truck Town East, near Exit 34. The gas line does not enter into the boundaries of the Upper or Lower Site.

8.2 Environmental Impacts

The construction- and operation-related energy impacts of each proposed Action Alternative are evaluated in this section. Energy impacts include any energy use associated with construction or operation of the Lower and Upper Sites (such as excavation and processing equipment and vehicle operations) and transportation of aggregate to offsite processing facilities.

8.2.1 Construction Impacts

8.2.1.1 Alternative 1–No Action

No construction-related energy impacts are associated with Alternative 1.

8.2.1.2 Alternatives 2 and 3 (Including Limited Lower Site Mining)

A number of construction activities would result in increased fuel use (gasoline, diesel) in the study area, including the following:

- Construction and enhancement of roadways
- Construction of buildings and a conveyor system (Alternative 2 only)
- Construction of processing facilities, a water piping system, and infiltration/storage ponds
- Clearing of trees and vegetation
- Continuation of existing electrical service to reach the site
- Development of power quality control measures
- Installment of a well for the site's water supply

Energy consumption for these construction activities would be short-term and have a low impact compared to operational energy impacts. Most construction-related activities would occur during the preliminary stages of the project.

8.2.1.3 Alternative 4–Upper Site Mining - Exit 38

Construction impacts associated with Alternative 4 would be similar to, but less than, impacts from Alternatives 2 and 3 because of the smaller area of impact.

8.2.2 Operation Impacts

8.2.2.1 Alternative 1–No Action

No energy impacts are associated with the No Action Alternative.

8.2.2.2 Alternative 2–Proposal: Lower and Upper Sites Mining - Exit 34

A number of activities proposed for Alternative 2 would result in impacts on energy use in the study area. These include additional traffic on I-90; operation of mining excavation equipment, aggregate processing equipment, asphalt and batch facility equipment, the conveyor line connecting the Lower and Upper Sites, and process water handling equipment; and building energy use.

Electrical Power

The electrical load at the proposed gravel operation would be approximately 3.6 MW (3,600 kilowatts [kW]). This load represents approximately 1,200 average houses (3 kW per house) in North Bend.

The majority of the electrical load would be at the Lower Site, where processing of the aggregate would occur. The proposed conveyor system could be designed to generate electricity, thus offsetting the electrical load of the conveyor itself. Other electrical loads would include the use of pumps to move water from the well to an underground vault, pumps for water used in processing, and pumps to transfer the water from the Lower to the Upper Site. Electrical loads on the Upper Site would be limited to area lighting.

When the Tanner Electric substation is operational, either the new Tanner Electric substation or PSE's existing substation will be capable of supplying the site's 3.6-MW demand. PSE indicated that a separate circuit could be used to supply Cadman, Inc. with electricity to power its equipment and facilities. A new distribution line would likely be constructed at the west entrance of the Lower Site and tie into existing lines along SE 146th Street; existing power lines may be upgraded at that time.

Both Tanner Electric and PSE are governed by the Washington Administrative Code, which addresses power quality issues such as flickering or dimming of power supplies to residences and businesses on the same power grid. These standards could be achieved through cooperation between Cadman, Inc. and the local power supplier selected. Overall, there would be a low potential for impacts on local electrical energy use if standards are met.

Fuel

Fuel for Onsite Uses. An onsite 14,000-gallon fuel storage facility would provide onsite diesel storage and dispensing equipment to fuel gravel trucks and other heavy equipment. Fuel deliveries would occur on an as-needed basis to fill the double-walled storage tank. No offsite fueling of equipment or transportation vehicles is planned.

Cadman, Inc. has proposed using propane as the fuel for an asphalt batch plant asphalt rotary dryer. A 10,000-gallon propane tank would be installed onsite. The asphalt batch process will use 2 gallons of propane for every 1 ton of asphalt produced (personal communication with Rod Shearer of Cadman, Inc., July 19, 1999). It is estimated that 150,000 tons of asphalt would be produced onsite each year, requiring 300,000 gallons of propane annually and an energy consumption of 27.4 billion BTUs. Cadman, Inc. would comply with all applicable regulations regarding the storage and use of propane gas.

Another possible source of fuel for asphalt processing is diesel fuel. The asphalt batch plant uses approximately 2.0 to 2.5 gallons of diesel per ton of asphalt (Cadman, Inc., 1999). If 150,000 tons of asphalt were to be produced per year, 375,000 gallons of diesel or an energy consumption of 52 billion BTUs would be required. Another 15,000- to 20,000-gallon onsite fuel tank would be necessary if diesel fuel were to be used for this process. This would result in a low impact on the diesel fuel supply within the region.

Fuel storage requirements for this alternative (30,000 to 35,000 gallons) are comparable to a commercial service station such as Truck Town, Inc.'s 76 station (38,000 gallons of storage). Yearly fuel use would be similar to the sales of a small service station, of which there are hundreds within King County.

Fuel Use for Transport. Traffic associated with Alternative 2 was analyzed by Heffron Transportation (1999) for I-90 in the site vicinity. Based on this analysis, one-way traffic along I-90 would increase by 936 heavy trucks and 62 passenger vehicle trips per day. The traffic that would result from Alternative 2 represents an energy consumption of 32.5 million BTUs per day per mile of highway (235 gallons diesel fuel per day per mile), or 11.9 billion BTUs per year per mile of highway (86,000 gallons of diesel fuel per year per mile). When compared to the baseline energy use of I-90 traffic, this represents a 16 percent increase in I-90's current energy use per mile of transportation. Although this represents an increase in fuel use, it would be a low impact when compared to the regional fuel supply.

8.2.2.3 Alternative 2A–Upper Site Mining and Limited Lower Site Mining

Because the amount of gravel that would be removed from the Lower Site would decrease under this alternative, there would be a slight decrease in energy use when compared to Alternative 2.

8.2.2.4 Alternative 3–Lower and Upper Sites Mining - Exits 34 and Exit 38

Alternative 3 would not include the conveyor. Changes in energy use due to the absences of the conveyor are described below.

Electrical Power

The maximum electrical load for Alternative 3 is estimated to be about 95 percent of energy consumed under Alternative 2 (3.6 MW), or about 3.4 MW. The electrical energy use impacts for this alternative would vary slightly from Alternative 2.

Electrical service would need to be extended from the Lower Site to the Upper Site, or a separate line could be constructed, entering the site near the Fire Training Academy.

Fuel

Fuel for Onsite Uses. The impacts under Alternative 3 would be similar to those listed for Alternative 2.

Fuel Use for Transport. Because Alternative 3 would not include a conveyor system linking the Lower and Upper Sites, aggregate would be hauled between the Upper and Lower Sites by truck. Based on estimates prepared by Heffron Transportation (1999), 118 trucks per day would travel between the sites (approximately 8 miles) to provide aggregate to the batch plants. The onsite batch plants would, in turn, produce up to 156 loads of concrete and 60 loads of asphalt, which would be hauled offsite.

An additional 568 gravel-truck loads would leave the site each day to supply aggregate to Cadman, Inc.'s facilities in Seattle, Black Diamond, and Redmond, while 152 truck loads would be hauled directly to project sites as fill. These 720 gravel trucks would exit via the Upper Site, traveling on SE Grouse Ridge Road to Exit 38 and then proceed on I-90 to Exit 34.

A total of 1,054 heavy trucks and 62 passenger vehicles would be added to I-90's base traffic flow by Alternative 3. Using the ODOT methodology described in Section 8.1.2, the incremental increase in energy use (fuel), as compared to Alternative 2, to transport aggregate and product from the Upper Site to Exit 34 would be 315 million BTUs per day (2,266 gallons per day), or 115 billion BTUs per year (827,000 gallons per year). On a per-mile basis, this would be an incremental increase in energy use over Alternative 2 of 39.4 million BTUs per day per mile of roadway (283 gallons per day per mile).

When the incremental increase in energy use per mile for hauling aggregate and product between the Upper and Lower Sites and the energy use for transportation on I-90 are compared to baseline energy use, Alternative 3 would result in a 36 percent increase over I-90's current energy use per mile of transportation. Although this is a high percentage of increase, the impact on the diesel fuel supply of the region would be low.

8.2.2.5 Alternative 3A–Upper Site Mining and Limited Lower Site Mining - Exits 34 and 38

Because the amount of gravel to be removed at the Lower Site would be less under Alternative 3A, there would be a slight decrease in overall fuel use for transport. However, the number of daily vehicle trips would not change; therefore, energy use per mile would remain the same as Alternative 3.

8.2.2.6 Alternative 4–Upper Site Mining - Exit 38

Alternative 4 would use less energy than Alternatives 2 and 3, as only the Upper Site would be developed and no batch plants would be constructed.

Electrical Power

Because the Lower Site would not be developed under Alternative 4, the total maximum electrical load for peak operations is estimated to be about 65 percent of Alternative 3, or about 2.2 MW. Impacts on local electricity use would be low if mitigation measures discussed in Section 8.3 are implemented.

As noted in Section 8.1.1, there are two alternatives for bringing power to the Upper Site. Both of these sources would require additional infrastructure to deliver power to the site.

Fuel

Fuel for Onsite Use. The impacts related to diesel fuel use under Alternative 4 would be the same as listed under Alternative 2 for the Upper Site. Propane gas would not be used under Alternative 4 because there would not be an asphalt batch plant onsite.

Fuel Use for Transportation. Extraction would occur on the Upper Site and material would be hauled directly from the site for delivery to project sites as fill and processed aggregate or as raw materials for Cadman, Inc.'s facilities in Seattle, Black Diamond, and Redmond. Based on estimates prepared by Heffron Transportation, about 568 trucks per day would haul aggregate to offsite processing facilities, and 316 trucks per day would haul aggregate to project sites as fill. Additionally, fewer employees would be required for site operations.

Daily operation at the site would add approximately 52 passenger vehicles per day traveling on SE Grouse Ridge Road. The incremental increase in energy use (fuel), as compared to Alternative 2, to transport aggregate and people from the Upper Site to Exit 34 would be 664 million BTUs per day (4,780 gallons of diesel fuel per day), or 242 billion BTUs per year (1,750,000 gallons of diesel fuel per year). On a per-mile basis, this would be an incremental increase in energy use over Alternative 2 of 21.4 million BTUs per day per mile of transportation (155 gallons of diesel fuel per day per mile).

A total of 886 heavy trucks (95 percent of Alternative 2's estimate) and 52 passenger vehicles would be added to I-90's base traffic flow by this alternative. Traffic generated as a result of Alternative 4 represents an energy consumption of 30.7 million BTUs per day per mile of highway (220 gallons of diesel fuel per day per mile), or 11.2 billion BTUs per year per mile of highway (81,000 gallons of diesel fuel per day per mile).

The incremental increase in energy use per mile for haul and transportation from the site and on I-90 under Alternative 4 would be a 26 percent increase over I-90's current baseline energy usage per mile of transportation. Although this is a high percentage of increase, the impact on the region's diesel fuel supply would be low.

8.2.3 Cumulative Impacts

Secondary or cumulative energy impacts from the proposed project should be viewed in terms of local and regional growth in energy demand. As populations increase and new or existing industries and commercial energy users grow and expand, the regional sources and availability, quality, and cost of energy will change. Based on historic trends, energy use and demand will expand throughout the area. The proposed project represents a minor input into the overall energy demand and distribution patterns of the Puget Sound region, reflecting annual consumption similar to sales of a small commercial fuel service station in King County. Impacts on local energy suppliers could be mitigated through the use of conventional industry practices. No specific secondary or cumulative impacts from the proposed project were identified during the energy analysis.

8.3 Mitigation Measures

8.3.1 Alternative 1–No Action

No mitigation measures would be required under Alternative 1.

8.3.2 Alternatives 2, 3, and 4 (Including Limited Lower Site Mining)

Based on estimated electrical power use, existing and future sources appear adequate to serve the needs of the project. Supply and distribution systems would be designed to ensure that the quality of power supply remains unchanged for area consumers. The following mitigation measures are recommended to minimize energy use and prevent potential impacts on local suppliers:

- Major electrically powered equipment should have power quality controls.
- There should be centralized electrical power conditioning within the development area, or separate power feeds and power quality controls originating at the power substation.
- The conveyor system for site use should be designed to generate and harness electrical power (Alternatives 2 and 2A only).

For Alternatives 2, 2A, 3, and 3A, the following mitigation measure are recommended:

- The large motors associated with the asphalt batch plant process should use variable frequency drive motors to prevent a large voltage drop when the motors are started.

- Transformers should be sized to handle the voltage drop as well as the working load, and should be as close as possible to each service point.
- The wire gauge should be sized to maximize voltage to the motors.

The proximity of the proposed site to the existing PSE and future Tanner Electric substations would minimize voltage fluctuations.

Energy use by heavy truck and passenger vehicle traffic associated with each Action Alternative could be minimized through mitigation measures such as the following:

- Specific transport vehicles should have fuel-efficiency improvements.
- There should be road improvements for more efficient transportation.
- Car pooling (passenger vehicles only) should be encouraged.
- Transportation methods and routes should be optimized.

All applicable regulations regarding storage and use of propane gas must be followed for Alternatives 2, 2A, 3, and 3A.

8.4 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts on energy were identified.